



School of Pharmacy PhD Projects 2014

Project Title 3D printing of novel drug delivery devices

Supervisors Prof. Karl Malcolm

Description Originally developed for the rapid prototyping of engineering models, the last decade has seen great advances in 3D printing technology and its applications. 3D printers based on fused deposition modelling (FDM) technology build parts layer-on-layer by heating thermoplastic material to a molten state and extruding it according to computer-controlled pathways. An exciting recent development in FDM 3D printing is the ability to print multiple polymeric materials within the same part, thereby allowing more complex devices to be produced. In this project, we propose to evaluate the potential of FDM 3D printing as a manufacturing tool for polymeric drug delivery devices. A number of key research areas will form the basis of the project: (i) *material selection*: suitable polymers will be identified that are both compatible with the FDM process and amenable to delivery of a range of drugs; (ii) *processing optimisation*: model drugs will be incorporated into thermoplastics and the FDM equipment modified to work with different polymer/drug blends; (iii) *design of drug delivery devices*: polymeric devices containing discrete drug-loaded and non-drug regions and having novel customisable release profiles will be developed and tested. The project, based in the School of Pharmacy but may use other facilities/equipment, will offer the student a unique opportunity to be involved in a cross-disciplinary project and to develop key skills across a range of engineering and scientific disciplines.

Start Date 1 October 2014

Keywords 3D printing; fused deposition modelling; drug delivery; polymers; implantable drug delivery system

Contact Details

pharmacypostgrad@qub.ac.uk

How to Apply

Postgraduate applications should be made using Queen's Online:

<http://go.qub.ac.uk/pgapply>

Please note that there are two application processes: one for admission to the university and another for postgraduate awards.

Further Information

Additional information for prospective postgraduate students can be found on the School of Pharmacy website:

<http://www.qub.ac.uk/pha>

and the Queen's Postgraduate website:

<http://www.qub.ac.uk/home/ProspectiveStudents/PostgraduateStudents/>